Computing Forecasts

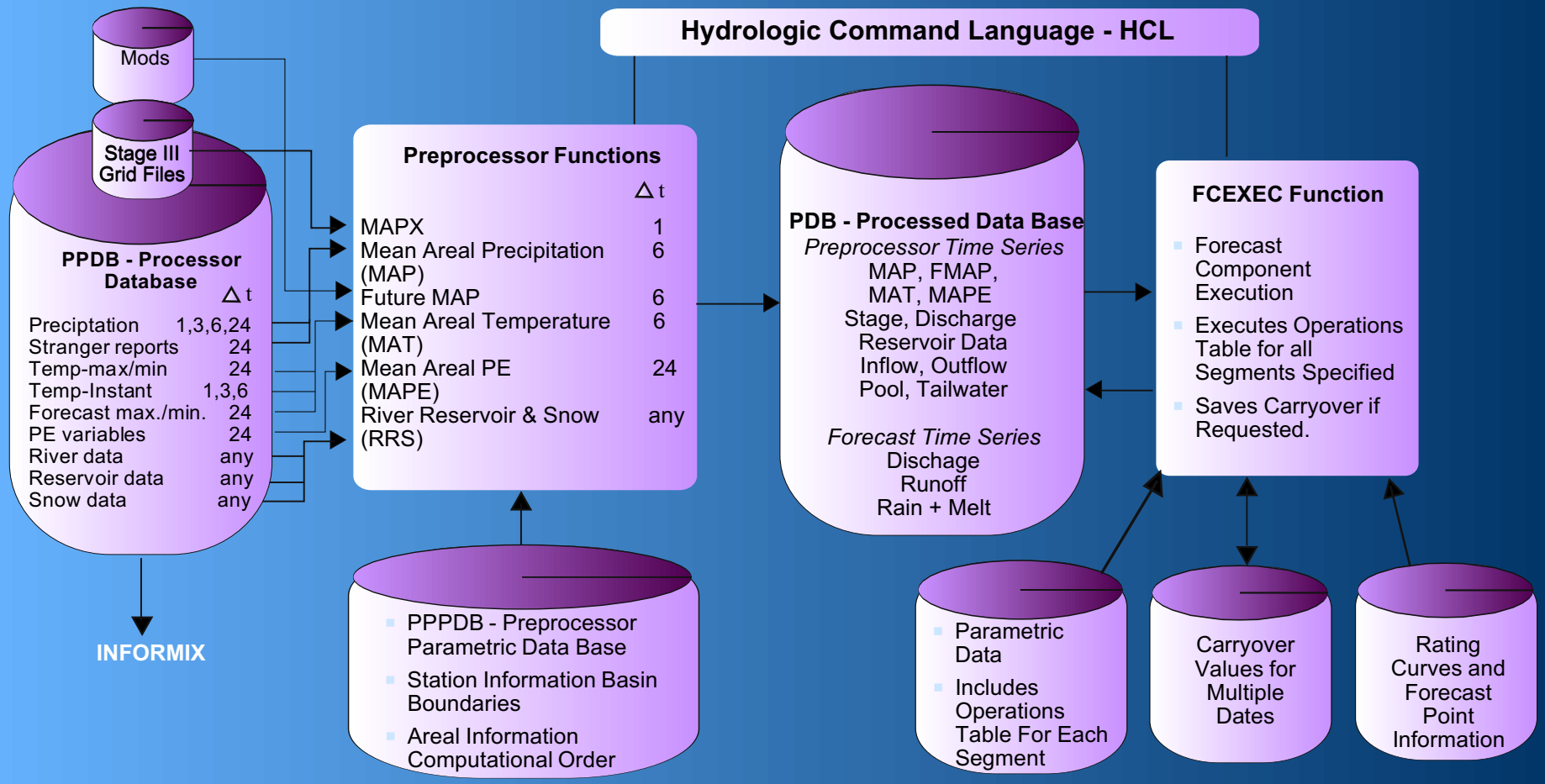
FCST

Forecast Program - FCST

Made up of separate programs linked together by HCL

- Preprocessor component
- Forecast component
- Ensemble Streamflow Prediction
- Read/write database
- Hydrologic Command Language (HCL)
- Utility programs

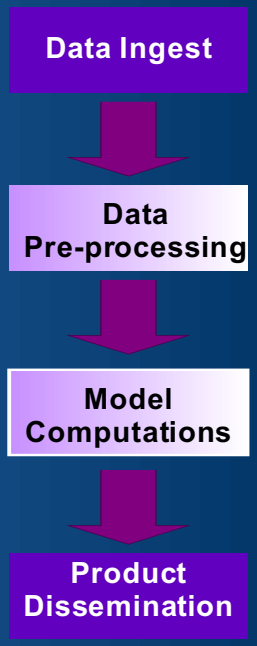
Forecast Program Interaction with OFS Databases



FCST (HCL)

HCL

- User interface to fcst
- Allows different components to act as one program
- Decodes commands
- Sets options
- Calls the parts needed
- Does not do computations



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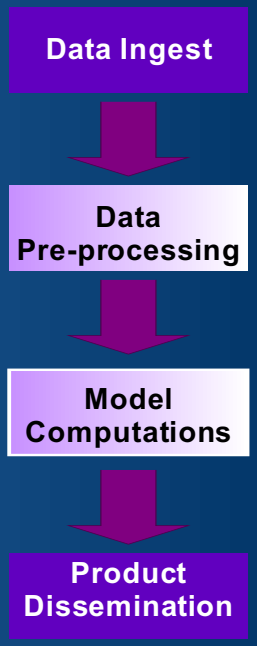
HCL Allows User To:

- Determine which functions to run.
- Determine order to run them.
- Make runtime adjustments to the options.



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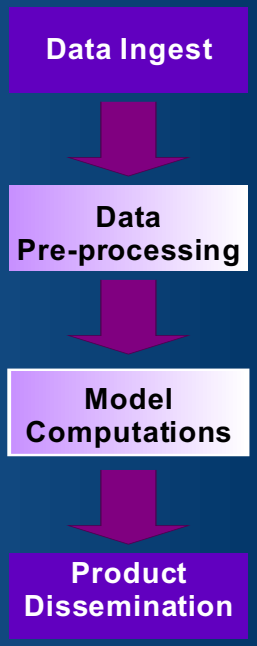
HCL Definitions – Nouns

- Function
  - process that performs work
- Technique
  - option for function
- Argument
  - switch for a technique
- Procedure
  - ordered list of HCL commands that allows symbolic replacement at runtime



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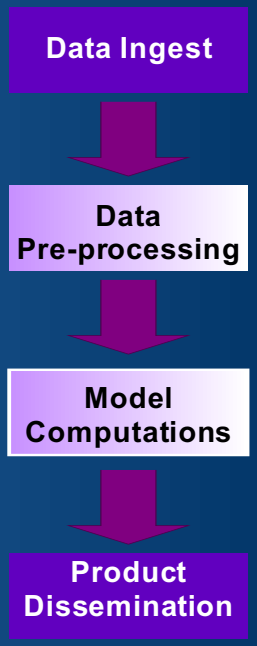
HCL Definitions – Verbs

- Define
  - initialize Function, Technique, or Argument values with default values
- Set
  - at runtime, can override defaults by setting Technique and Argument values
- Compute
  - starts the run of a Function using the Technique and Argument values
- Execute
  - start the run of a Procedure



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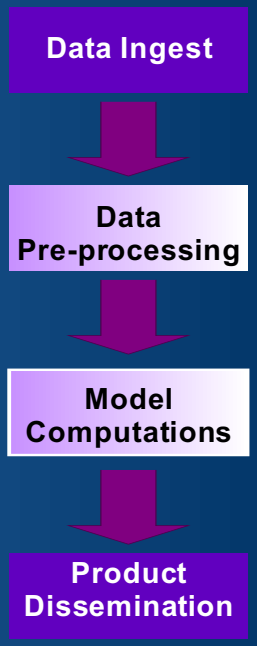
HCL Syntax – General

- All commands start with @
  - The @ must be in column 1 to be recognized
  - HCL will continue processing a command until another is found
- Technique values are enclosed in parentheses with no blank between the name and parentheses
  - Example: PRNTFMAP(0)
- Comments start with a $
  - Can be anywhere on the line



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HCL Syntax - Date Formats

- MMDDYYHHTZC (10250012Z)
  - Abbreviations
    - MMDDYYHH (10250012)
      - time zone defaults to one in User Parameter file
    - MMDDHHTZC (102512Z)
      - year defaults so that MMDD is to the closest to computer date
    - MMDDHH, MMDDYY (102512, 102599)
      - if last 2 numbers are in the range 0- 24 will assume they are HH and year will default to closest one to computer
      - if last 2 are from 25-99, assume they are YY and will default to closest one to computer clock
    - MMDD (1025)
      - Hour defaults to 12Z
      - Year defaults so that MMDD is closest to the computer date

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HCL Syntax - Dates (cont.)

- *+-days HHTZC
  - Where * is TODAY's date
  - days is the number of days before (-) or after (+) TODAY
  - days must be 2 digits
  - Abbreviations
    - *+daysHH
    - *+days
    - *HHTZC
    - *

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HCL Syntax - Dates (cont.)

- MMDD/year/HHTZC
  - year must be 4 digits
  - Abbreviations
    - MMDD/year/HH
      - Time zone defaults to user parameter setting
    - MMDD/year/
      - Hour defaults to 12Z

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Common HCL Commands

- COMPUTE – Run a function
- EXECUTE – Run a procedure
- SETOPTIONS – Set runtime values for functions, techniques, procedures
- SETLDFLT – Set local default for functions, techniques, procedures
- SETTODAY – Set date to be used as today's date
- SETUPARM – Display/change value of user parameters

Selected Techniques

Common Techniques

- STARTRUN
- ENDRUN
- LSTCMPDY
- CGROUP
- FGROUP

Selected Techniques

- FUTPRECP
  - MAPX
    - Whether FMAP values will be incorporated into the MAPX time series
    - Valid values
      - 0: no future precip used
      - 1: all future precip available will be used
  - FCEXEC
    - Whether FMAP values associated with an MAP will be used or partially used.
    - Valid values
      - -1: all FMAP will be used
      - 0: no FMAP will be used
      - 1-120: specified number of hours of FMAP will be used

Selected Techniques

Saving Carryover

- In general
  - Replaces the oldest available date on file
  - Saves today at 12z
  - Updates any CO witin the run period
  - Use SAVEDATE and FREEDATE to protect/unprotect date
- SAVETDY
  - SAVETDY(1): will save carryover for today
- NUMCOSAV
  - Takes -1, or up to 10 dates as arguments
  - NUMCOSAV(-1) will update all CO dates within the run period
  - NUMCOSAV *-2 *-1 * will save CO for today and previous 2 days

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Summary of the Features of Operational Preprocessors

- FMAP - Future Mean Areal Precipitation
  - Scope: whole RFC
    – Initially set to 0.0
  - Time step: 6 hour FMAP time series
  - Observed data: none
  - Future data: All values come from MOD cards - .FMAP6 or .FMAP24
  - Estimation: None
  - Order: Determined by ORDER command

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Summary of the Features of Operational Preprocessors (cont.)

- MAP - Mean Areal Precipitation
  - Scope: FG, CG, or AREA run (max 10 Areas)
  - Time step: 6 hour MAP time series for observed period (STARTRUN-LSTCMPDY)
  - Observed data: daily and incrementatl values
    - Converts all 1-hr and 3-hr stations to 6-hr
  - Future data: none - uses FMAP time series for MAP area
  - Estimation: Estimatiors determined by NETWORK
  - Order: Determined by ORDER command (except for AREA run)

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Summary of the Features of Operational Preprocessors (cont.)

- MAPX - Mean Areal Precipitation - NEXRAD
  - Scope: whole RFC
  - Time step: 1-hr
  - Observed data: uses hrouly gridded estimates from StageIII or MPE up to LSTCMPDY
  - Future data: none - incorporates FMAP values into MAPX time series
    - FUTPRECP technique
  - Estimation: none
  - Order: Determined by ORDER command

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Summary of the Features of Operational Preprocessors (cont.)

- MAPE - Mean Areal Potential Evaporation
  - Scope: whole RFC
  - Time step: 24-hr
  - Observed data: temperature, dew pt., wind speed, solar radiation
  - Future data: none - blends to monthly areal average
  - Estimation: none for a station - blends to areal mean
  - Order: Determined by ORDER command

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Summary of the Features of Operational Preprocessors (cont.)

- MAT - Mean Areal Temperature
  - Scope: whole RFC
  - Time step: 6-hr
  - Observed data: uses max/min and instantaneous (1, 3, and 6-hr)
  - Future data: can use forecast max/min
  - Estimation: estimators set by NETWORK
  - Order: alphabetical order from NETWORK

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Summary of the Features of Operational Preprocessors (cont.)

- RRS - River, Reservoir, and Snow
  - Scope: whole RFC
  - Time step: 1, 2, 3, 4, 6, 8, 12, or 24 hr
  - Observed data: uses instantaneous and mean
  - Future data: can use forecast data
  - Estimation: depends on data type and if missing are allowed or not
  - Order: alphabetical order from NETWORK